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First results on properties and concentrations of radiation defect centers in nitrogen-enriched, high-resistivity FZ silicon

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High-resolution photoinduced transient spectroscopy (HRPITS) has been used to determine the properties and concentrations of radiation defect centers produced by the irradiation with 23-MeV neutrons in monocrystalline, nitrogen-enriched, high-resistivity silicon, grown by the float zone (FZ) method. The nitrogen concentration in the material ranged from 9E14 to 2.5E15 cmˆ-3. The material was irradiated with three 1-MeV equivalent neutron fluences: 1E14, 5E14 and 1E15 cm-2. A number of irradiation-induced defect centers with activation energies from 30 to 550 meV were resolved. The changes in the concentrations of detected centers with increasing the neutron fluence are presented. The results indicate that doping with nitrogen may have an effect on the concentrations of radiation defect centers. In particular, the concentrations of radiation centers with the activation energies of 30 meV, 310 meV, 360 meV, 380 meV, and 460 meV are found to be significantly lower in the material with a higher nitrogen concentration.

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